REMARKS

Applicant thanks the Examiner for acknowledging the election without traverse of claims 1-11 in the Response to Restriction Requirement filed September 7, 2001.

Applicant thanks the Examiner for acknowledging the claim for priority under 35 U.S.C. § 119 and receipt of the certified copies of the priority documents filed December 20, 2000.

Applicant thanks the Examiner for considering the reference cited in the Information Disclosure Statement filed on December 20, 2000.

Applicant thanks the Examiner for accepting the drawings submitted on December 20, 2000.

Status of Application

Only claims 1-11 are under consideration in this Application. Claims 12-24 are withdrawn from consideration as a result of the Response to Restriction Requirement filed September 7, 2001. Claims 1-11 are rejected. Claim 25 is added to further describe the invention.

Indefiniteness Rejections Under 35 U.S.C. § 112, Second Paragraph

The Examiner has objected to or rejected claims 1-11 as containing informalities. Claims 1 and 11 have been corrected to eliminate the informalities cited by the Examiner. In response to the Examiner's assertion that there is insufficient antecedent basis for "'third cover' in line 4 of claim 4", Applicant refers the Examiner to lines 1-2 of claim 4, where "a third cover layer" is

properly introduced as a new element into the claim. Withdrawal of the claim objections and rejections is respectfully requested.

Anticipation Rejections of Claims 1 and 2 Under 35 U.S.C. § 102(b)

The Examiner has rejected claims 1 and 2 under 35 U.S.C. § 102(b) as being anticipated by Geffken et al. (US 5985762). This rejection is respectfully traversed. For the following reasons it is submitted that Applicant's claims are novel over Geffken.

Geffken discloses (in FIG. 3E) a copper wire 21, a silicon nitride (Si_3N_4) barrier 22, and an insulator 23, which may be composed of silicon dioxide (SiO_2), a metallic adhesion and diffusion barrier layer 29, such as tantalum, tantalum nitride, titanium nitride, tungsten nitride, tungsten silicon nitride, or tantalum silicon nitride, and copper 30.

Geffken does not teach or suggest "covering an outer surface of the conductor" with "refractory metal nitride," as recited in claim 1. FIG. 3D relied upon by the Examiner (Office Action page 3, first full paragraph) only discloses layer 29 below the copper 30.

Thus, withdrawal of the rejections of claims 1 and 2 is respectfully requested.

Obviousness Rejections of Claims 3-8 Under 35 U.S.C. § 103(a)

The Examiner has rejected claims 3-8 under 35 U.S.C. § 103(a) as being unpatentable over Geffken (US 5985762) in view of Farkas (US 6001730). This rejection is respectfully traversed.

The Examiner takes the position, and the Applicant agrees, that Geffken does not disclose a second cover layer made of refractory metal, or a third cover layer made of dielectric, between

the conductor and first cover layer. However, the Examiner takes the position that the missing limitations are "well known in the art because Farkas discloses a diffusion layer."

As noted above, Applicant submits that Geffken does not teach or suggest at least a first cover layer that covers anything more than the bottom of the copper 30. Farkas clearly does not teach or suggest this limitation that is missing from Geffken, as barrier layer 21 surrounds only the lower portion of interconnect 28. Therefore, Applicant respectfully submits that the Examiner has failed to establish *prima facie* obviousness of the claimed invention, as "all the claim limitations must be taught or suggested by the prior art." In re Royka, 490 F.2d 981 (CCPA 1974).

Additionally, beyond the failure of Farkas to teach a layer that covers anything more than the lower portion of interconnect 18, there is simply no teaching or suggestion of the provision of multiple cover layers made of alternative combinations of refractory metal nitride, refractory metal, and dielectric as recited in claims 3-8. Only a single barrier layer 21 is disclosed in Farkas.

Thus, withdrawal of the rejections of claims 3-8 is respectfully requested.

Obviousness Rejections of Claim 10 Under 35 U.S.C. § 103(a)

The Examiner has rejected claim 10 (10/1) under 35 U.S.C. § 103(a) as being unpatentable over Geffken (US 5985762) in view of Li et al. (US 6040243). This rejection is respectfully traversed.

Applicant submits that Li et al. still does not provide the limitations of claim 1 which are lacking from the Geffken reference, as Li does not teach or even suggest a cover layer on the outside surface of the conductor.

Additionally, Li does not teach or suggest the structure recited in claim 10, where the bottom of the first cover layer is approximately at the top of the first dielectric layer, and the top of the first cover layer is approximately at the top of the second dielectric layer. Li does not teach a cover layer located as claimed in relation to the dielectric layers, as Li's barrier 92 is broken in areas where layers 80 and 72 exist, and has no discernible top or bottom.

Thus, withdrawal of the rejection of claim 10 is respectfully requested.

Obviousness Rejections of Claim 11 Under 35 U.S.C. § 103(a)

The Examiner has rejected claim 11 (11/1) under 35 U.S.C. § 103(a) as being unpatentable over Geffken (US 5985762) in view of Nogami et al. (US 6214731). This rejection is respectfully traversed.

Applicant submits that Nogami et al. still does not provide the limitations of claim 1 which are lacking from the Geffken reference, as Nogami does not teach or even suggest a cover layer on the outside surface of the conductor.

Thus, withdrawal of the rejection of claim 11 is respectfully requested.

New Claims

Claim 25 is added to recite that the first cover layer of claim 1 entirely covers the outer surface of the conductor. As discussed above, none of the applied references teach or suggest a layer that covers the conductor.

Conclusion

In view of the foregoing, it is respectfully submitted that claims 1-11 and 25 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-11 and 25.

In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A semiconductor device comprising:

(a) a substrate having a surface;

(b) a dielectric formed over the surface of the substrate; and

(c) a wiring line buried in the [first] dielectric [layer];

the wiring line including a Cu-based conductor and a first cover layer covering an outer surface of the conductor;

the first cover layer being made of refractory metal nitride.

11. (Amended) The device according to claim 1, wherein the wiring line buried in the dielectric [in which the] fills a trench [has] having inner side faces tilted at an angle of 70° to 80° with respect to an imaginary plane of a bottom of the trench.

Claim 25 is added as a new claim.